

Materials Laboratory Strategic Directions 05-07

8/14/2006

Geotechnical

Steve Lowell		2005						2006												2007					
Task	Description	1st Quarter			2nd Quarter			3rd Quarter			4th Quarter			5th Quarter			6th Quarter			7th Quarter			8th Quarter		
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1	Unstable Slopes Program Folio													100%											
2	GIS Platform													80%											
3	New Rock Slope Photo Analysis Technique													100%											
4	State Owned Pits and Quarries													90%											

Jim Cuthbertson		2005						2006												2007					
Task	Description	1st Quarter			2nd Quarter			3rd Quarter			4th Quarter			5th Quarter			6th Quarter			7th Quarter			8th Quarter		
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
5	Electronic Preservation of Geotechnical Files													100%											
6	Foundation Construction Submittals													60%											
7	Seismic Foundation Retrofit Strategy													40%											
8	Geogrid Subgrade and base course stabilization													33%											

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Tony Allen		2005						2006												2007					
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		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
9	Geotechnical Design Manual													85%											
10	LRFD design spec's development													30%											
11	MSE Wall Research													40%											

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Task	Description
1	<p>Develop 4 page legislative/press folio, in cooperation with HQ Program Management Office, that briefly describes current unstable slopes program, current limitations of the program with regard to funding and the ability of the program to reduce risk to the public (i.e., risks associated with lack of funding), program needs, and what improved funding for the program “buys” the state of Washington.</p> <p>a. Develop folio by February 2006.</p> <p>b. Assigned to: Steve Lowell/Lynn Moses</p> <p>Status: Final draft completed March 2006. Final publication occurred April 26, 2006.</p>
2	<p>Develop strategy and implementation plan (including estimated cost, time, and FTE’s required) to develop GIS platform useful for geotechnical purposes, and develop plan to include new and existing geotechnical borings statewide in a GIS database.</p> <p>a. Develop strategy and implementation white paper by February 2006.</p> <p>b. Develop funding strategies by March 2006 (discretionary funds, cost recovery, other WSDOT offices such as UCO, WSF, etc.).</p> <p>c. Assigned to: Steve Lowell/Lynn Moses</p> <p>Status: A position description, function, and objectives of GIS implementation for the Geotechnical Division has been developed as of March 2006. A detailed implementation strategy white paper is yet to be developed.</p>
3	<p>Implement new technology to remotely assess rock slopes using photographic techniques for stability analysis and design purposes.</p> <p>a. Implement by March 2006</p> <p>b. Assigned to: Steve Lowell/Tom Badger</p> <p>Status: The equipment for the technology (SIROVISION) has been obtained, and the technology has been tried on the SR-90 MP 66 Rockslide for its design (March 2006). The trial was very successful. Field measurements were used to verify the accuracy of the measurements obtained from SIRIVISION - it was found that strike and dip measurements were accurate to within 5 degrees, and the technology enabled the field mapping to be much more complete and done much more quickly. Staff training on SIROVISION completed 7/18/06. Implementation is now complete.</p>

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4	<p>Engineering geologists to work with regions that have state owned pits and quarries to identify marginal materials and to identify new sources of better materials. Begin with NE corner of the state and aggregates for HMA.</p> <p>a. Develop plan by June 2007.</p> <p>b. Assigned to: Steve Lowell/Lynn Moses</p> <p>Status: Issues and implementation of this strategic objective were discussed at the statewide RME meeting in March 2006 as a first step in developing a strategy to deal with this issue. Possible strategies were developed, which include: allow lower quality standards to be used in that local region for applications where the property is not as critical (by special provision), or could plan on replacing the material sooner. Must also look carefully at the cause of the poorer test results. The cause may not be important to the application being considered. The next step will be to flesh out and formalize these concepts to develop the final strategy. Have been working with Program Management to secure funding for pit and quarry work in Pend Orielle County. \$70,000 has been requested for the 2007-2009</p>
5	<p>Develop plan for electronic preservation of the Division's geotechnical files, including how to do it and development of funding strategies.</p> <p>a. Develop plan by April 2006.</p> <p>b. Assigned to: Jim Cuthbertson/Russell Steele</p> <p>Status: Basic plan has been developed (March 2006). Database has already been created, and 2500 records have been entered. The next step is to begin scanning the actual information in the project files to be attached with the database. We are proceeding with the plan is to hire one to two temporary technicians to prepare files for scanning, and are working with HQ's to set up the scanning, including getting the scanning equipment. The scanning work is anticipated to</p>
6	<p>Reduce/streamline foundation construction submittals, working with industry groups (e.g., ADSC) and the HQ Construction Office.</p> <p>a. Identify and develop specification changes by June 2006.</p> <p>b. Assigned to: Jim Cuthbertson/Mark Frye</p> <p>Status: A task group met in 2005 to begin assessing what could be done. Little work has been done on this since due to heavy workload.</p>

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7	<p>Develop strategy with the Bridge Office, and implementation plan, to include assessment of seismic foundation stability problems (primarily liquefaction) as part of Bridge Office seismic retrofit program. This effort, once put into motion, would identify specific bridges that are vulnerable to foundation stability problems, an assessment of the potential risk to the bridge and impact to the public, and an estimate of cost to address the instability so that these needs can be prioritized for programming purposes.</p> <p>a. Develop strategy and implementation white paper by December 2006. b. Assigned to: Jim Cuthbertson</p> <p>Status: A meeting was held on April 3, 2006 with the Design Office, Program Management, and the Bridge Office to discuss this issue. The need to strategically plan for and address this issue was recognized by all. A conceptual level strategy was developed to begin addressing this need. This strategy includes a first cut identification of bridges located in areas mapped as having liquefiable soils (Program Management has already made a first cut at this). A more detailed evaluation and estimate will be performed for bridges within currently funded Nickel and TPA projects. A more detailed statewide action strategy will be developed as part of the next highway system plan update - Program management, with help from the Bridge and Structures Office and the Geotechnical Division, will take the lead. Key in this strategy is the development of lifeline corridors, which may be a ways out in being accomplished.</p>
8	<p>Develop investigation and implementation plan for use of geogrids in pavement base coarse reinforcement and as subgrade reinforcement for pavements.</p> <p>a. Summarize results from nationwide survey by December 2005. b. Review research results obtained to date by others, and in consideration of nationwide survey results, determine what is known, and what is not known that needs to be known, developing preliminary design and use policies for geogrids for this application. Do by December 2006. c. Identify potential test sites where this trial design policy could be tested. Do by March 2007. d. Assigned to: Jim Cuthbertson</p> <p>Status: The survey has been completed, but the final report on the survey is yet to be completed due to the heavy workload that has occurred during the last several months.</p>

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9	<p>Develop more detailed chapter for the GDM on foundation design for marine structures, addressing the specific needs of WSF.</p> <p>a. Complete final draft by June 2006</p> <p>b. Assigned to: Tony Allen/Jim Cuthbertson</p> <p>Status: Work to update the GDM has begun. The new guidance on design of marine structure foundations will be part of this effort. The first step to accomplish this is to rewrite the foundations chapter (Chapter 8) to accomodate changes in the AASHTO LRFD Design Specifications. Chapter 8 will be heavily referenced by the marine structure foundation chapter - this rewrite of Chapter 8 is now completed, as well as updates to other GDM chapters. The chapter on marine structure foundations has also been updated to include special design objectives for marine structure foundations. All of this is currently in final review.</p>
10	<p>Continue to develop geotechnical design procedures in LRFD format for aspects of foundation and wall design that are not currently in LRFD format (soil nail walls, micropiles, noise walls, reinforced slopes, etc.), primarily through continued participation in the AASHTO Bridge Subcommittee and various NCHRP panels, and possibly other research.</p> <p>a. This will be on-going; soil nail walls and micropiles to be implemented by 2007.</p> <p>b. Assigned to: Tony Allen</p> <p>Status: An agenda item on tieback wall design, and the LRFD calibration work needed to develop that agenda item, has been completed and submitted to the AASHTO Subcommittee for approval at the national meeting in May, and has been approved. The current AASHTO specifications are more conservative than WSDOT's past practice, and the new agenda item will make the level of safety more consistent with our past practice. We are also working on the development of an LRFD specification for micropile design. The draft specifications have been put together by the industry, and the AASHTO T-15 committee is in review mode on this. An agenda item to move the new micro pile specifications into the AASHTO specifications is planned for July 2007.</p>

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11	<p>Develop long range plan to fully implement MSE wall research (K-Stiffness Method).</p> <ul style="list-style-type: none">a. Complete research reports and publish full design method in well respected journals – submit journal papers by October 2006b. Work with other states/agencies to identify potential instrumented test walls, including those with lower quality backfill materials to establish accuracy of methodc. Complete RMC research and coordinate with NCHRP study to broaden applicability of research to lower quality backfill materials and also to seismic conditionsd. Prepare agenda item for AASHTO to include new design method in the AASHTO LRFD specificationse. Assigned to: Tony Allen <p>Status: Four journal papers on the K-Stiffness Method have just been sent for publication, two on the previous work for walls with high quality backfill, and one of those two is on LRFD calibration using the database developed from this research. Two other papers have been sent to an international journal. The most recent work has been done with the assistance of a visiting scholar from Japan, in which the K-Stiffness method was shown to be valid for a series of Japanese walls, broadening the applicability and acceptance of this research. The method has now also been expanded to lower quality backfill materials through the evaluation of Japanese and other full scale wall case histories, and the K-Stiffness method now has a proposed modification to accomodate the cohesion that is usually present in lower quality backfill materials. A lower quality backfill source for use in the RMC full scale walls is now being sought, so that this adaptation of the K-Stiffness method can be refined. A fifth paper summarizing the results of the instrumented walls on SR-18, the first walls purposely designed using the new method, has been accepted in an international conference.</p>